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Report of the Third Meeting of the Working Party on Rice Breeding, International Rice Commission, Bandung, Indonesia, May 1952.
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Report of the Fifth Meeting of the Working Party on Rice Breeding, International Rice Commission, Tokyo, Japan, October 1954.
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FAO Plant Protection Bulletin

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World Reporting Service on Plant Diseases and Pests

Plant Protection Activities of FAO Designed to Strengthen National Services and Develop International Co-operation

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Readers of the FAO Plant Protection Bulletin are no doubt well aware of some aspects of the work of the Food and Agriculture Organization of the United Nations in the plant protection field. They will, in particular, be aware of the nature and purpose of the International Plant Protection Convention, since the Bulletin is published as one means of implementing certain provisions of that Convention.

Other aspects of FAO's plant protection work may not be as well understood. Now that FAO is in its Tenth Anniversary Year, it seems appropriate to present a brief summary of this work, which has been carried out by the Agriculture Division, to indicate its scope and accomplishments during these first 10 years of FAO's existence.

The Food and Agriculture Organization of the United Nations came into existence on 16 October 1945 when, at the first FAO Conference in Quebec, Canada, representatives of thirty-two governments signed the Constitution. Subsequently the membership has grown to seventy-one. The establishment of FAO was first discussed at a conference in Hot Springs, Virginia, U. S. A., in May 1943, where representatives of governments had been convened to discuss world food and agricultural problems. As a result of those discussions, an Interim Commission was established which functioned until the Organization was formally established in Quebec.

The nature of the Organization's activities in the plant protection field is indicated by the title of this paper. As an international organization set up by governments to serve those governments, FAO does not itself carry out plant protection work in the field or in the laboratory. Neither does it employ extension workers to carry the results of research to farmers. The tasks of the Organization fall into two broad categories, first, to help governments strengthen their own services and second, to encourage and facilitate intercountry co-operation to ensure more effective protection from plant pests and diseases.

Against this background it should be readily apparent that FAO's methods of working differ in a number of respects from the methods used by national organizations, or local organizations within countries, which deal directly with the farmer and his problems. It may be helpful, therefore, to indicate the methods used by FAO in dealing with agricultural problems. They are as follows:

1. Providing for the exchange of information and ideas, and arranging for co-ordinated action on problems of concern to two or more countries through the holding of technical meetings, on a regional or world-wide basis;
2. Studying the needs of countries which may request assistance, and proposing programs for agricultural development through the sending of survey missions;
3. Advising and assisting governments in planning and implementing technical

projects by sending experts to such countries;
4. Imparting knowledge of specific techniques to trainees who will carry forward specific agricultural development projects through the holding of training centers;
5. Providing training needed for carrying forward projects on which advisory assistance has been given by experts through the granting of fellowships to technical personnel for study outside their home countries;
6. Publishing documents summarizing new technical findings and other materials for the guidance of Member Countries, particularly in planning and implementing projects for economic development;
7. Providing limited amounts of technical supplies, equipment and literature required by experts, and which are not available in the countries where those experts are serving, for carrying forward their advisory activities;
8. Maintaining contacts with the agricultural leaders in Member Countries to obtain information on their problems and to supply information and advice where requested;
9. Providing continuing mechanisms for consultation among countries which have common problems and for implementation of co-operative programs by organizing permanent technical bodies as arms of FAO;
10. Laying the basis for common action among governments by proposing, or assisting governments in, the formulation of international agreements.

These methods provide a great deal of flexibility, yet conform to the Organization's terms of reference. In actual practice the various methods are inter-related, and it is often necessary to use a number of these methods in dealing with any particular problem, or set of problems, as will be seen from the following descriptions of activities which have been undertaken in furthering the development of plant protection measures.

The Organization draws its funds primarily from two sources. All Member Governments contribute on an agreed scale to the Regular Program. A considerable number of the governments contribute to an Expanded Technical Assistance Program (ETAP), portions of which are executed by appropriate agencies in the United Nations family, according to their terms of reference. All of the activities described above are carried out to some extent under the Regular Program. Activities under the Expanded Technical Assistance Program are chiefly of the types described under items 3, 4, 5 and 7 above. In addition some work has been carried out under the "UNRRA–Transfer Fund", a special fund transferred to FAO by the United Nations Relief and Rehabilitation Administration (UNRRA) when the latter agency was closing its activities.

The main activities carried out during FAO's first ten years by its Agriculture Division are described in the following sections. Actually, the Agriculture Division of FAO was not established until December 1946, and the first active work on plant protection began early in 1947. Hence the work described covers a period of only about eight years. The descriptions are necessarily very brief and are only intended to give an over-all indication of the nature of FAO's activities in the plant protection field.

Entomology

Entomological activities have been limited chiefly to the control of infestation in stored grains, which will be dealt with in a separate section, and control of locusts, the olive fly (*Dacus oleae* Rossi) and the fall webworm (*Hyphantria cunea* Dr.), together with direct technical assistance to countries on a number of entomological problems. As in other fields, it has been necessary to concentrate on a limited number of important problems upon which action at the international level could be of benefit to the Member Countries of FAO.

The crops of most countries lying within the world's tropical and semi-tropical belts are recurrently endangered by periodical plagues of various locust species. The control of each of the various types of migratory locusts is an example of a typical international problem, demanding concerted action by the affected countries. The Organization first expressed its interest in locust problems in 1949 when it convened a meeting attended by representatives of eleven countries in Beirut, Lebanon, on the Moroccan locust (*Dociostaurus maroccanus* Thunb.), a species of great importance in southern Europe, the Near East and North Africa. In that meeting delegates laid a basis for further studies on the control and prevention of this locust,

providing for exchange of information among countries and for further research.

The desert locust (*Schistocerca gregaria* Forsk.) is one of the most important species and, in spite of recently intensified efforts to control it, remains a major threat to agricultural production in a vast belt stretching from the Indian sub-continent through the Near East and northern and equatorial Africa to the Atlantic Ocean. FAO convened a meeting of experts on the control of the desert locust at Rome in October 1951, which was attended by representatives of 13 governments. The recommendation of this meeting that a Technical Advisory Committee be established to advise FAO on suitable action was confirmed by the Sixth Session of the FAO Conference (November-December 1951). This Committee's main functions are to advise FAO on the desert locust situation, on measures necessary to keep it under control, and with regard to requests for assistance to supplement national efforts. The Committee met in March and November 1952, April 1953, and June 1954.

The Organization aims at encouraging a regional approach to the desert locust problem. In order to supplement national resources and to maintain strategic regional reserves, FAO procured during 1952, under the Expanded Technical Assistance Program, anti-locust equipment and supplies to the value of about US $ 350,000. By these means, FAO contributed directly, during 1952 and 1953, to the success of anti-locust campaigns in Pakistan, Iran, Iraq, Jordan, Saudi Arabia, Yemen, Ethiopia and British Somaliland. This was followed by the exchange of services between neighboring countries, which has been the outstanding feature of recent desert locust campaigns.

Four spraying aircraft supplied to the British anti-locust organization to assist in the development of a promising technique for the destruction of locust swarms in flight have operated successfully in East Africa. Other activities have included the circulation to Member Countries, for their guidance, of reports on the progress of anti-locust campaigns in the various countries, and on the development of new methods of control of desert locust.

Regional meetings have been convened by FAO to explore particular problems in controlling the desert locust. In October 1952, at a conference in Algiers, measures to improve regional co-operation in Western Africa were discussed. This matter was further developed at a meeting between French and Spanish representatives convened by FAO in Madrid in January 1955. A meeting in Damascus in November 1953 was attended by representatives from 15 countries, and plans were prepared for an international campaign against the desert locust in the Arabian peninsula, which is of particular strategic importance as locust swarms escaping from extensive breeding there affect the development of the plague throughout the entire invasion zone. Subsequently the 7th Session of the FAO Conference authorized the expenditure of US $ 150,000 from the 1954 Regular Program budget to match contributions towards the international campaign which it was proposed should be co-ordinated by FAO. Plans for the 1955 campaign in the Arabian Peninsula were prepared at meetings held in Cairo in June 1954 and in Rome in September 1954. FAO established a co-ordinating center at Jeddah and furnished further equipment and supplies. During 1955 eight governments participated in the campaign and another six governments contributed supplies and funds. The 1956 campaign was discussed at a meeting in Rome in April 1955.

Migratory locusts are also important in Central and South America. In Central America, where the locust, tentatively classified as *Schistocerca paranensis* Burm., affects Costa Rica, El Salvador, Guatemala, Honduras, Mexico and Nicaragua, FAO's work began in 1948 at the peak of a serious outbreak. Efforts were first directed towards giving technical advice on combating the pest. Since 1951, when the latest locust cycle came to an end, the Organization, through its Expanded Technical Assistance Program, has provided the services of a locust expert to the Anti-Locust Committee of Central America and Mexico to which the Organization has been nominated as Permanent Adviser. The expert studied the biology and ecology of the insect and determined the most important outbreak

areas, which have now been placed under permanent supervision. A technical report on the locusts of Central America and Mexico is now in the course of preparation. The services of an expert were made available to assist in this work during 1951–53 and again beginning in 1954 and a fellowship has been granted to one of the laboratory assistants for further study.

In South America, FAO undertook a preliminary study of the South American locust, *Schistocerca paranensis*, which affects Argentina, Bolivia, Brazil, Paraguay and Uruguay. Recommendations have been aimed at assisting governments in the solution of the problem and liaison has been established with the Inter-American Permanent Anti–Locust Committee which has its headquarters in Buenos Aires. Further work is under consideration.

Considerable attention has also been given to the fall webworm. This insect is native to North America where it rarely becomes a serious pest because natural parasites and chemical control measures directed against other destructive insects in orchards and forests keep it under control. During the war the pest gained entrance to Europe where it spread rapidly causing considerable destruction to many trees. Its spectacular spread suggested that the pest may have entered Europe free of parasites. While European countries started investigations on the life history of this insect in its new home and undertook limited chemical control operations in the periphery of the infested areas with a view to limiting its spread, the Organization has, in co-operation with the government of Yugoslavia, introduced into that country some of the American parasites of this insect. The task of collecting and shipping the parasites has been entrusted on a contract basis to the Commonwealth Institute of Biological Control, in Ottawa, Canada.

Over three thousand parasites were shipped to Yugoslavia in 1953 and about six thousand five hundred in 1954. It is expected that at least a number equal to that of 1954 will be introduced in 1955. Certain species of the parasites were liberated in 1954 on an experimental basis in the Voivodina region, where the fall webworm attacks have been heavy. This project, which is carried out under the FAO Expanded Technical Assistance Program, has included the provision of special equipment for handling parasites in Canada and in Yugoslavia, and the granting of three fellowships to Yugoslavian experts to extend their knowledge in laboratory and field techniques for the biological control of insects.

Olives and olive oil have long been among the basic foods of all the countries of the Mediterranean basin and exports of these products form a substantial part of the national economy of these countries. The greatest enemy of this tree, the olive fly, causes an average loss of over 25 percent of the total production, and the oil obtained from fruit that has been attacked by this insect may contain from 10 to 20 percent of acids which are detrimental to health.

The one recognized method of control of the olive fly gave satisfactory results in limited areas and only under certain conditions. At the request of Member Governments the Organization convened a meeting in 1953, in Florence, Italy, to consider this problem and to suggest more efficient control methods. Realizing the need for intensive research, agreement was reached on plans for a series of experiments for 1953 and 1954. The Organization was requested to co-ordinate this research and the participating governments named technical representatives to a working party for further consultations and planning. An FAO entomologist was assigned to act in liaison with the members of the working party and to make periodic visits to countries to see research operations in progress and to assist in evaluating the results.

In addition to the work on locusts, the fall webworm and the olive fly, work has been carried out on a number of other entomological problems.

In connection with the activities of the International Rice Commission's Working Party on Rice Breeding, a paper was prepared on the more important insects affecting rice production (7).

In addition to the insects which are destructive to crops and transmit human and animal diseases, and the parasites and predators which limit their destructiveness, there are others, such as the silkworm, which may be exploited by man to his profit.

TABLE 1. *Summary of advisory assistance to FAO Member Countries in the field of plant protection, under the Expanded Technical Assistance Program and the UNRRA-Transfer Fund, up to 31 December 1954*

Country receiving assistance	Subject	Name of expert and his country of origin	Funds under which expert was financed	Length of service in weeks
Afghanistan	Disease survey and control	H.E. Vollert (Germany)	ETAP	26
	General problems and locust control	G.S. Cotterell (U.K.)	ETAP	112
	Sericulture, 2 experts	K.T. Keh (China) T.K. Hsia (China)	ETAP	204
Austria	Fall webworm	L.P. Mesnil (France)	ETAP	4
Burma	Sericulture	S.I. Kano (Japan)	ETAP	139
Ceylon	Insect transmission of virus diseases	W.B. Carter (U.S.A.)	ETAP	26
	Virus diseases	W. Newton (Canada)	ETAP	47
Chile	Potato blight	K.O. Müller (Germany)	ETAP	26
	Bramble control	E.A. Helgesen (U.S.A.)	ETAP	26
China	Entomology	J. Deal (U.S.A.)	UNRRA–Transfer	56
	Manufacture of insecticides and equipment	O. Pollak (U.S.A.)	UNRRA–Transfer	57
Ecuador	Grain storage	R.J. Blas (U.S.A.)	ETAP	4
Egypt	Cotton insects	R. Wiesmann (Switzerland)	ETAP	52
Haiti	Storage construction	L.R. Ray (U.S.A.)	ETAP	39
	Grain storage experiments	H.E. Gray (Canada)	ETAP	8
India	Grain storage [1]	L.S. Harrison (Australia)	ETAP	26
	Plant protection organization in Uttar Pradesh	W.A. Rawlings (U.S.A.)	ETAP	30
Iran	Disease survey and control	R.L. Steyaert (Belgium)	ETAP	56
Iraq	Disease survey and control	J.L. Allison (U.S.A.)	ETAP	47
	Storage construction	E.C. Brackney (U.S.A.)	ETAP	4
	Cotton insects	R.L. Walker (U.S.A.)	ETAP	47
Israel	Plant protection organization and insect control	S. Marcovitch (U.S.A.)	ETAP	52
Libya	Pest control	H. Martin (Switzerland)	ETAP	130
Mexico	Pineapple diseases	M.B. Linford (.U.S.A.)	ETAP	8
Poland	Colorado beetle and general entomology [2]	W.A. Rawlings (U.S.A.)	UNRRA–Transfer	13
Syria	Plant quarantine and cotton insects	L.W.D. Caudri (Netherlands)	ETAP	82
	Pest control	A.E.M. Mistikawy (Egypt)	ETAP	139
Yugoslavia	Organization of pesticide laboratory	H. Heddergott (Germany)	ETAP	52
	Fall webworm	L.E. Mesnil (France)	ETAP	4
Near East Region	Locust control	O.B. Lean (U.K.) M.H. Hosni (Egypt) A.E.M. Mistikawy (Egypt) B.P. Uvarov, Consultant (U.K.)	ETAP	195
Central America and Mexico	Locust control	E. Morales Agacino (Spain)	ETAP	130

[1] Joint project with Economics Division.
[2] Included also a brief advisory visit to Czechoslovakia on San José scale.

Clearly, work with this insect does not come under the general heading of "plant protection," but reference to it is included for the sake of completeness.

Through its Expanded Technical Assistance Program experts provided by the Organization to two countries have introduced better varieties of silkworms and mulberry trees, and are giving instruction and advice on better methods of culturing the silkworm as a basis for a profitable cottage industry. Also, under its Expanded Technical Assistance Program, which was initiated late in 1950, the Organization has provided experts to a number of governments to advise on many entomological problems. This assistance, together with fellowships granted, and similar assistance provided earlier under the UNRRA-Transfer Fund, are summarized in Tables 1 and 2.

Reduction of Losses during Storage

It has been estimated that the average annual losses in stored grain due to insects, rodents and fungi exceed 10 percent of the total production. This quantity exceeds the amount of grains entering international trade and would be enough to feed at least 250 million people. Such losses assume a special importance because they occur after all production and storage costs have been sustained and quite frequently after such grains have been transported great distances from the centers of production to the centers of consumption.

FAO convened in London, in 1947, an international meeting which was attended by representatives of 27 countries. The meeting discussed all aspects of the problem ranging from the world distribution of pests to better

TABLE 2. *Summary of fellowship training provided for FAO Member Countries in the field of plant protection, under the Expanded Technical Assistance Program and the UNRRA-Transfer Fund*

Country receiving fellowships	Subject and number of fellowships provided	Country in which training was carried out	Funds under which fellowship was financed	Total amount of training in weeks
Ceylon	Nematology (1)	U.S.A.	ETAP	8
Chile	Potato blight (1)	U.K., Sweden, Germany	ETAP	12
	Bramble control (1)	Italy, France, Spain	ETAP	56
Cyprus (U.K.)	Entomology and pathology (2)	U.S.A., Australia.	ETAP	112
Ecuador	Entomology (1)	U.S.A.	ETAP	47
	Grain storage (1)	Canada	ETAP	26
Greece	Entomology (1)	Switzerland	UNRRA–Transfer	26
	Plant pathology (1)	United Kingdom	UNRRA-Transfer	12
India	Sericulture (1)	Japan	ETAP	26
Iran	Plant pathology (2)	France, Belgium, Switzerland	ETAP	112
Iraq	Plant pathology (1)	U.S.A., U.K.	ETAP	52
Israel	Citrus diseases (1)	U.S.A., Italy	ETAP	39
Libya	Plant pathology (1)	Cyprus	ETAP	52
Syria	Locust control (1)	France, Algiers, Africa	ETAP	52
Yugoslavia	Pesticides (2)	France, Germany, Switzerland, Belgium, Holland, Germany	ETAP	56
	Fall webworm (3)	Switzerland, France	ETAP	117
Central American Region and Mexico	Locust control (1)	Algiers, Spain, France	ETAP	26

storage facilities, drying of grain for storage and methods of infestation control. The papers presented at the London Meeting, which discuss the basic problems of infestation control in stored grains, have been compiled into an FAO publication entitled "Preservation of Grains in Storage" (2). Another publication has also been issued describing methods used in storing and drying grain in Canada, the United States and the United Kingdom (3).

The London meeting was followed by regional meetings in: Florence, Italy, 1948; Palmira and Cali, Colombia, 1949; and San José, Costa Rica, 1950. These meetings, which were of a practical nature in that they included demonstrations on the major aspects of grain handling and control operations, encouraged discussion of particular problems and resulted in the initiation of active programs for better storage and control practices in most of the participating countries. An additional Far Eastern meeting was convened in 1952 in Bangkok, Thailand, jointly with the FAO Economics Division, where all the economic and technical aspects of rice storage, milling techniques and distribution were discussed.

Increasing attention is being given to rice storage problems, through an *ad hoc* working party set up following a recommendation of the Fourth Session of the International Rice Commission. This working party will study the question of reducing losses in stored rice, together with other aspects of rice storage and processing, and recommend a program of action to the Fifth Session of the Commission.

Periodic visits of short duration by staff members have been made to many of the FAO Member Countries in order to discuss with experts the problem of better storage and reduction of losses and to give pertinent advice whenever necessary. Also, following the Palmira meeting referred to above, and in preparation for the San José meeting, an expert on grain storage problems served for a year in Costa Rica to advise on grain storage activities. Under its Expanded Technical Assistance Program the Organization has supplied experts to a number of governments and one fellowship has been awarded; this latter work is summarized in Tables 1 and 2.

Plant Pathology

Although plant diseases of various origins have caused heavy losses to crops and great concern to growers, organized surveys and investigations to determine their nature and to effect their control are still lacking or inadequate in many countries. To assist the governments in preventing or reducing such losses, emphasis has been placed on the development of sound research programs and on the introduction of control measures adapted to local conditions. Since 1951, experts have been assigned for varying periods under the Expanded Technical Assistance Program to advise on problems of plant pathology; this work is also summarized in Table 1, and the fellowships granted are listed in Table 2.

Brief notes on various plant diseases have been prepared from time to time in response to enquiries from governments and other sources. These included a paper on certain diseases of rice for use in connection with the activities of the International Rice Commission's Working Party on Rice Breeding (5).

Some work on rusts and bunt is carried out through a Near East Committee on wheat and barley breeding. Although the Committee is concerned primarily with breeding problems, these include breeding for resistance to rusts and bunt, and plant pathologists participate in the meetings and the co-operative work. Four meetings have been held: in Turkey, June 1952; in Egypt, April 1953; in Syria, April - May 1954; and in Pakistan, March 1955. An extensive trial to develop rust and bunt resistant stocks for use as parental material in national breeding programs is under way in co-operative nurseries established in nine countries. In 1954 these included 363 varieties of wheat and 64 of barley.

Weed Control

The use of chemicals for weed control was introduced towards the end of the last century, but intensive studies in chemical weed control was undertaken only in the last decade. At present many widely used herbicides are available on the market. The synthetic preparation of growth hormones opened up a new chapter in weed control. In order

to provide a convenient guide for the proper application of the newly-developed hormone-type weedkillers, and the possibility of harmful effects on crop plants, a publication which brings together the salient points of available information with regard to these chemicals was issued under the title "Weed Control by Growth-Regulating Substances" (4). A new publication covering all aspects of weed control is being prepared. In addition, in accordance with the recommendation of the International Rice Commission, a mimeographed working paper entitled "Combating *Imperata cylindrica* and *Cyperus rotundus*" was prepared to give a summary of the methods of controlling the two noxious weeds found in most rice-growing regions.

Technical assistance has been given to Chile on the control of zarzamora, a wild bramble which has infested a total area of about two million hectares in that country; the assistance included the provision of an expert and two fellowships (see Tables 1 and 2).

The Report of the Mission for Poland (1) discussed the methods of increasing the total area under crops, with particular reference to better methods of cultivation and weed control, including controlling weeds through the use of chemical weedkillers.

General Plant Protection

Some important plant pests and diseases are still restricted in distribution, but their potential danger of spreading threatens many countries, especially in view of the accelerated modern transportation. The International Plant Protection Convention represents an effort of FAO Member Nations to promote co-operation in preventing spread and in combating these destructive plant pests and diseases.

The need for such a Convention to strengthen international action and to replace the "International Convention for the Protection of Plants" of 1929 and the "Phylloxera Convention" of 1881, first came before the FAO Conference at its Fifth Session in 1949. In accordance with the recommendation of that Session, FAO presented a draft to all Member Governments for comments and also to several technical meetings for consideration. The draft Convention, thus several times revised, was approved by the FAO Conference at its Sixth Session in 1951. It has been signed by thirty-seven governments and adhered to by several others. Up to the time of writing, 29 governments, including both signatories which have ratified it and adhering members, have become parties to this Convention.

In accordance with the Convention, FAO has the responsibility of administering procedural matters and is charged with the implementation of certain technical provisions. Although the limited resources at its disposal have prevented FAO from undertaking all these activities at once, progress has been made along several lines.

The Convention provides that FAO, in co-operation with contracting governments, should organize a World Reporting Service for circulating information on the incidence of plant pests and diseases of economic importance in different countries, on the degree of damage they cause, and on their control. The service came into operation in October 1952, with the initiation of the "FAO Plant Protection Bulletin" as a regular medium for publishing reports received from collaborating governments and other sources. Information of wide geographic coverage, ordinarily unavailable from other periodicals, has appeared in this Bulletin. It should be noted here that an earlier periodical, the "International Bulletin of Plant Protection", was published by the former International Institute of Agriculture from 1927 to 1946. The resources of that Institute were absorbed by FAO.

To remedy the present diverse restrictions and requirements imposed by different countries governing the importation of plant materials, the Convention provides for uniform regulatory and quarantine procedures and a model phytosanitary certificate. Such procedures and the model certificate are now adopted by many countries which have recently re-gazetted, or are in the process of re-gazetting, their quarantine legislation. In order to facilitate the exchange of information on quarantine legislation and to better mutual understanding among governments on this subject, a publication containing abstracts of quarantine laws and regulations of forty countries has been issued under the title

"Digest of Plant Quarantine Regulations" (6). A First Supplement to the Digest was issued as a mimeographed document in 1954.

Assistance has been given to a number of countries under the Expanded Technical Assistance Program, aimed at advancing national plant protection activities. This work is summarized in Tables 1 and 2.

Recognizing the magnitude and diverse nature of problems relating to plant protection, the Convention provides for the establishment of regional plant protection organizations as co-ordinating bodies in appropriate geographic regions. FAO has encouraged Member Governments to implement this provision in order to promote more effectively international co-operation through the advancement of regional activities. Assistance has been given to the European Plant Protection Organization in developing a regional reporting system on plant pests and diseases which has been integrated with the FAO World Reporting Service, in convening technical meetings on specific problems, and on other matters.

The governments of Central America, of Mexico, and of Panama, with FAO's support, have also recently concluded an agreement aimed at the establishment of a regional plant (and animal) protection agency to assume over-all responsibility for co-ordinating investigations and control operations. In 1954, an FAO consultant made a detailed survey of existing facilities and activities in this region as a basis for recommending improvements.

In December 1954 a regional meeting was convened in Singapore to consider and finalize a draft plant protection agreement for the Southeast Asia and Pacific region, aiming at the exclusion of destructive plant diseases and pests which are not yet established in the region through the adoption of concerted measures by all the governments involved. The text of the agreement was approved by the FAO Council in June 1955, subject to the reservation that the definition of the region be modified to the satisfaction of the interested governments. After the Director-General has contacted those governments on this matter, the agreement will be submitted to all governments responsible for territories in that region with a view to their acceptance.

In addition to the consideration of disease and pest problems in association with rice, wheat and barley breeding, mentioned elsewhere in this paper, the delegates to the series of eight meetings on hybrid maize, held in Europe from 1947 to 1955 have given some attention to diseases and pests of maize.

Summary

The work of FAO in the plant protection field has developed along several lines including:

(*a*) Providing for inter-country consultation on common problems, through the holding of international and regional meetings, thus providing a basis for developing co-ordinated programs in some cases and for the exchange of information;
(*b*) Providing for interchange of information among governments through the FAO Plant Protection Bulletin, through Agricultural Studies and Development Papers;
(*c*) Assisting groups of governments in the development of co-ordinated attacks on pests such as locusts, the olive fly and the fall webworm;
(*d*) Advising and assisting individual governments on specific problems such as control of the Colorado beetle, control of cotton insects, control of pineapple diseases, control of insects in stored grains, bramble eradication, etc., by providing experts as advisers, giving special training through fellowships, and providing limited amounts of specially needed supplies and equipment; and,
(*e*) Providing a basis for a common approach to plant protection problems under the International Plant Protection Convention, both on a global and a regional basis.

An indication of the extent of the service rendered to governments in various phases of plant protection may be found in two readily measurable items, namely experts and fellowships. Under the Expanded Technical Assistance Program up to the end of 1954, these have totaled 1,715 man-weeks of experts' service and 793 man-weeks of training under fellowships, while under the UNRRA-Transfer Fund these figures are 126 and 38 man-weeks respectively.

Efforts for agricultural development do not yield quick results, but built up gradually and return substantial results in many cases

only after some time, often a number of years, even in highly-developed countries. Such developments are even slower in countries where trained workers are scarce and research and extension facilities are very limited. Establishment of inter-governmental co-operation also requires considerable time and step-by-step development. Hence it is too early to evaluate accurately the effectiveness of FAO's efforts to assist its Member Governments either singly or in groups, where co-operation is desirable. However, there is sufficient evidence of results of positive value to countries to justify the continuation, and expansion as opportunity permits, along the present lines; and this FAO proposes to do under its Regular and Expanded Technical Assistance Programs.

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Incidence of Stripe Rust of Wheat in Central Italy in 1954

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THE abnormal climatic conditions in the spring of 1954 had certain beneficial effects on crops; one of these was the delay of the appearance of stripe rust, *Puccinia glumarum*, on wheat.

Because of its low temperature requirements, epidemics of *Puccinia glumarum* generally occur in Central Italy before other cereal rusts develop, and are also the first to disappear. In cases of heavy outbreaks which fortunately do not occur frequently, considerable losses in yield may result, for the rust attacks the leaves in their most active stage of growth, causing them to wither completely.

Glumes, which usually are heavily infected in Central and Northern Europe, are only rarely attacked in Central Italy because the spread of the rust at its later stages of development is usually suppressed by the prevailing high temperature.

Records on the appearance and disappearance of *Puccinia glumarum* in Central Italy in past years show that first signs of infection were generally noticed between mid-March and the first 10 days of April and the epidemics usually ended in May. Exceptions were observed only in 1938 and 1940, when the first pustules were found on 4 and 10 May respectively, in Florence.

In the spring of 1954, however, first appearances of yellow rust were recorded in Central Italy on the following dates:

Rome:	28 April, in the National Institute for Cereal Breeding.
	9 May, in the Plant Pathology Station.
	15 May, on the Maccarese lands.
Viterbo:	18 May, near the city.
Rieti:	24 May, on the Milardi Augusto farm.
	25 May, on the Mirabella Camillo farm.
Frosinone:	23 May, on the Sibilia Cesare farm (Anagni district).
Ancona:	27 May, on various farms (Bellisio district).

The above records show clearly how far the incidence of *Puccinia glumarum* was delayed, and as a consequence only light infection was recorded. Using the scale of the United States Department of Agriculture [1] for estimating rust intensity, it was estimated that the infection reached 10-25 percent only in a few localities, varying on different wheat varieties as follows: about 10 percent on Aquila, 5-10 percent on Vivenza, 10-25 percent on Tevere and 25 percent on Virgilio. The attacks were thus practically negligible between the Tirrenian and the Adriatic.

As a consequence of the mild spring temperatures, the period suitable for the multiplication and spread of inoculum in *Puccinia glumarum* was also notably prolonged. The production of teleutospores, which normally takes place in May, generally prior to the outbreak of stem rust, *P. graminis tritici*, and corresponding to the withering of leaves, was markedly delayed in the spring of 1954, when the first teleutospores were recorded at Viterbo on 7 June and at Rieti on 16 June. It was interesting to note that at this late date the production of uredospores was still continuing.

The incidence of stripe rust on wheat in 1954 is therefore rather unusual in that its appearance was delayed for about a month in comparison with average dates in past years and it remained in many localities in the uredosporic stage until the grain had ripened.

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[1] MELCHERS, L. E. and J. H. PARKER. Rust resistance in winter wheat varieties. U. S. Dept. Agr. Bull. 1046. 1922.

Plant Diseases in British Colonial Dependencies: a Half-Yearly Report

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Malaya

THE fungi associated with sudden death of cloves (*Valsa eugeniae*) and die-back of cloves (*Cryptosporella eugeniae*) in Zanzibar have been found in Malaya (Penang Island). Both fungi were described very recently and this appears to be the first record of their occurrence outside the Zanzibar Protectorate.

Mauritius

The existence of ratoon stunting disease of sugar cane has been determined in Mauritius. The disease, probably of virus origin, is not considered a new introduction in the Island and may have been responsible for the running out of some of the varieties cultivated in the past.

Ratoon stunting disease is not apparently yet widespread on the varieties now under cultivation. The variety M. 134/32 has been found in Australia to show considerable stunting when infected, but it is in general cultivated in the Island with very good results up to six or seven ratoons. In certain regions, however, with heavy soil conditions and high humidity, the disease seems to be present along with chlorotic streak, and what may be a mixed infection sometimes results in severe stunting in such localities.

Uganda

The sunflower disease in Uganda (see *FAO Plant Prot. Bull.* 2 : 188, 1954) has shown no epidemic spread though scattered outbreaks have been recorded. The disease appears to resemble the Argentine virus superficially, but as yet there are no possible grounds for identifying the two. Export of seed for planting to countries which are not known to be affected has been stopped.

Outbreaks and New Records

Canada

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THE following records, made in Canada in 1953, are of insects new either to certain provinces or to certain plant hosts, but previously known to be present elsewhere in the country.

Filbertworm

The filbertworm, *Melissopus latiferreanus* (Wlshm.), was recorded for the first time in British Columbia at Castlegar, where it was reared from hazel (*Corylus* sp.). The larvae feed on several species of nuts, particularly *Corylus* spp. and *Quercus* spp. A recent survey revealed a total of 514 acres of commercial filbert plantings in the Province. The insect occurs commonly in western areas of the United States, where it is an important pest of filbert nuts, and in eastern North America, including the Provinces of Ontario and Quebec in Canada.

European Earwig

The European earwig, *Forficula auricularia* L., was recorded for the first time in Nova Scotia when specimens were taken in the wharf area at Yarmouth. The owner of the wharf operated ships running to St. John's, Newfoundland, where the insect had been established for some time.

Pine Root Collar Weevil

Although believed to be native to North America, the first recorded outbreak of the pine root collar weevil, *Hylobius radicis* Buch., in Ontario occurred near Angus in 1953. The plantation affected was 30 acres in extent and was planted with Scots pine (*Pinus sylvestris*) and red pine (*P. resinosa*) averaging two inches diameter breast high. All living and dead trees examined were infested. Mortality of Scots pine was approximately 25 percent and of red pines somewhat less. A survey in the spring of 1954 revealed that the insect is widely distributed in the Angus area. Serious damage to pines, particularly Scots pine, in New England, U.S.A., and the states bordering on the Great Lakes has been attributed to the weevil.

European Pine Shoot Moth

The European pine shoot moth, *Rhyacionia buoliana* (Schiff.), first found in Newfoundland on Scots pine at St. John's in 1952, was found on the Avalon Peninsula in 1953, indicating establishment.

Orange Tortrix

The orange tortrix, *Argyrotaenia citrana* (Fern.), damaged brambles (*Rubus* spp.), including loganberry and raspberry, in the Oak Bay area, Vancouver Island, British Columbia. Previous records of damage, other than in greenhouses, included apricot (1947) and peach (1952), both in the Oak Bay area. The insect has occurred as a greenhouse pest on rose, carnation, geranium, and other plants since 1930 in British Columbia. It is a major pest of citrus fruits in California and of brambles in Washington and Oregon, U.S.A.

Cabbage Maggot

The cabbage maggot, *Hylemya brassicae* (Bouché), was reared from turnip, cabbage, and cauliflower at Regina Beach, Saskatchewan. This is the first authentic record of the insect in the Province.

Peru

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Occurrence of Thecaphora smut on Solanum stoloniferum on the Coast

A disease of Andean potato (*Solanum tuberosum* subsp. *andigenum*), locally known as "buba", was found in 1939 by Barrus and Müller[1] on the Andes Mountains in Venezuela. The affected tubers bore superficial warty excrescences and were sometimes cracked or otherwise misshapen. Section through the cortex revealed the presence to a depth of 1 cm. or more of numerous brownish-black pustules containing sporeballs in brown powdery masses. The causal fungus was described by Barrus[2] as *Thecaphora solani*.

The same disease was found also in the Andean regions of Peru and Ecuador, but in Peru it was previously confused with powdery scab (*Spongospora subterranea*)[3], since these two diseases usually occur in the same potato fields in mountain regions.

Thecaphora smut was found only at altitudes between 2,500 and 3,000 meters and was considered an endemic Andean dis-

[1] Barrus, M.F. and A.S. Müller. An Andean disease of potato tubers. Phytopath. 33: 1086-1089. 1943.

[2] Barrus, M.F. A Thecaphora smut on potatoes. Phytopath. 34: 712-714. 1944.

[3] Abbot, E.V. La 'roña' y la 'rancha' o 'hielo' de la papa. Estac. Exper. Agr. Soc. Nac. Agrar., Lima (Peru) Circ. 7. 1928.

ease. The Andean potato was the only recorded host, although, according to Barrus and Müller, Bliss Triumph (*Solanum tuberosum*) could be infected artificially.

In 1954, this disease was observed infecting tubers of *Solanum stoloniferum* (D.G.V. 1018) in an experimental plot at La Molina, situated on the Pacific Coast at an altitude only of 251 meters. The infected tubers showed typical symptoms (Figure 1), whereas all other varieties were free from this disease.

Solanum stoloniferum, which probably belongs to the series *Longipedicellata*, is a native to Mexico, especially in the mountains of the central part of the country. The seed was originally collected by Dr. D. S. Correll in Mexico and was propagated at the potato station in Wisconsin. Part of the tubers which resulted were sent to Peru for testing.

Investigations are being carried out to determine whether the causal fungus is normally present in the soil in the coastal region and the environmental factors favoring the development of the disease.

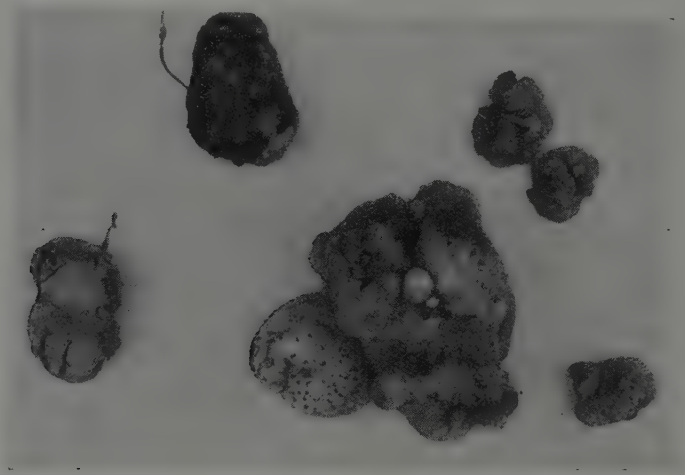

Figure 1. Tubers of *Solanum stoloniferum* infected by *Thecaphora solani*.

Southern Rhodesia

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Discovery of Khapra Beetle in Stored Beans

In February 1955 an infestation of the Khapra beetle, *Trogoderma granarium* Everts, was discovered at Bulawayo in beans stored for African rations. The beans were a mixed collection of different but unknown kinds from various source sin Southern Rhodesia. In the same storehouse some beans from the Bechuanaland Protectorate were stored. The infestation was so severe that it could very well have been of more than one year's duration.

The identity of the insect has been confirmed by Mr. D.W. Hall, of the Pest Infestation Laboratory at Slough, England. Mr. Hall has previously identified this insect

from Northern Rhodesia. It does not appear to have been recorded from Southern Rhodesia, however.

Unusual Incidence of the Maize Stalk Borer

Moth of the maize stalk borer, *Busseola fusca* Fuller, emerged from 2 December 1954 to 10 January 1955 from infested irrigated maize, indicating that another adult generation had been present when the crop was planted in September. Normally at that time this species is in diapause in the larval stage and moths do not emerge until November-December. This apparent extra generation may lead to an increase in population.

Outbreak of Coffee Locust

Severe infestation of the coffee locust, *Phymateus viridipes* Stal., occurred in the Selukwe area from May to September 1954, on a wide variety of trees and shrubs. The outbreak is apparently a two-yearly occurrence and the cycle is now being investigated.

Plant Quarantine Announcements

Mexico

Foreign Quarantine No. 14 for prevention of the introduction and propagation of khapra beetle (*Trogoderma granarium*), published in the *Diario Oficial*, Vol. 208, N°. 24, 29 January 1955, restricts the importation of the following products proceeding from the States of California, Arizona and New Mexico of the U. S. A.: peas, sorghum, barley, soybean, nuts with or without shells, maize, beans, oats (natural or processed), wheat, alfalfa and seeds thereof, castor bean, cotton seeds, wool, maize flour, wheat flour, bread, processed cereals, press cake, processed rice, raisin, dried milk, dried blood, wastes of animal products. Packings and means of transport for these products are also subject to restrictions.The importation will be authorized by the Directorate-General of Agricultural Defense, on the presentation of a phytosanitary certificate indicating the origin of the consignment and, whenever applicable, stating the method of treatment by fumigation or disinfestation.

United Kingdom (Scotland and Northern Ireland)

Scotland. The Importation of Plants (Scotland) Order, 1955, made on 12 March 1955, supersedes the Importation of Plants (Scotland) Orders, 1947 to 1954, the Importation of Plants (General License) (Scotland) Orders, 1953 to 1954, and the Importation of Raw Cherries (Scotland) Order, 1954. The provisions of this new Order are essentially the same as those of the Importation of Plants Order, 1955, for England and Wales (see *FAO Plant Prot. Bull.* 3 : 60-62. 1955).

The Importation of Vegetables (Scotland) Order, 1955, which came into operation on 1 April 1955, modifies the restrictions for specified periods of 1955 in respect of certain vegetables from specified districts of Belgium, France and the Netherlands. The provisions are essentially the same as those dealing with vegetables in the Importation of Potatoes and Vegetables Order, 1955 for England and Wales (see *FAO Plant Prot. Bull.* 3: 95. 1955).

Northern Ireland. The Importation of Plants (Northern Ireland) Order, 1955, made on 15 March 1955, supersedes the Importation of Plants (Northern Ireland) Orders, 1947 to 1954, and the Importation of Forest Trees (Prohibition) (Northern Ireland) Order, 1952. The provisions of this new Order are similar to those of the Importation of Plants Order, 1955, for England and Wales except in the following two cases:

1. Under " prohibited imports " the following plants are listed, in addition to the potatoes and plants included in the Importation of Plants Order, 1955, for England and Wales:

   Chrysanthemum plants
   Cut chrysanthemum flowers
   Plants of *Ulmus* spp.
   Plants of *Quercus* spp.
   Plants of *Castanea* spp.
   Plants of *Populus* spp.
   Plants of the following genera of the Order *Pinaceae*, viz. *Abis*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga*, *Sequoia*, *Thuja* and *Tsuga*.

2. The importation of raw cherries from continental Europe into Northern Ireland is not restricted.

The Importation of Vegetables (Northern Ireland) Order, 1955, which came into operation on 1 April 1955, contains essentially the same provisions as those governing the importation of vegetables in the Importation of Potatoes and Vegetables Order, 1955, for England and Wales.

News and Notes

European Study Group on Crop Protection, 1955

A European Study Group on plant protection, convened by the Permanent European Committee for the International Congress of Crop Protection, will take place at Mondorf les Bains, Luxembourg, 7-9 September 1955.

When the Permanent European Committee met on 23 November 1954 at Paris, it was decided that, in view of the rapid progress made in the chemical control of plant pests and diseases, the holding of the International Congress of Plant Protection at intervals of five years is too distant to achieve its objectives and a meeting on a smaller scale should be convened before the next Congress in 1957 for exchange of current information. As given in its provisional program, the European Study Group thus initiated will discuss problems such as relations between pesticides and public health, insect resistance to insecticides, progress in the control of plant viruses and chemical weed control in pastures. In addition, three working groups will meet to consider the following subjects:

a. Standardization of pesticides, including methods for analysis and bio-assay, nomenclature and terminology, and hazards of pesticides.
b. Methods of investigation, including classification of phytosanitary literature, application of biometric methods, taxonomic problems and control of maize and poplar insects.
c. Extension problems.

The Permanent European Committee also decided to widen the scope of the future International Congress of Crop Protection to cover problems relating to chemical control, such as the biology and ecology of pests and disease-causing organisms, and various aspects concerning application equipment.

At the invitation of the German delegation, the Fourth International Congress of Crop Protection will be held in Germany in the summer of 1957, thus avoiding duplication with the International Entomological Congress to be held in 1956 and the International Botanical Congress to be held in 1958.

Roma - Tip. del Senato del dott. Giovanni Bardi

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